Georgia's Stewardship Forests

Managing for Quail in Forested Habitats

Pine Forest Management Practices

In Georgia, longleaf/slash, loblolly/shortleaf, and oak/pine forests comprise a substantial proportion of the bobwhite's geographic range. Pines produce pine seeds, used by quail as fall food, and large quantities of pine needles, which serve as a fuel for prescribed burning. However, on many sites, trees occur at densities that shade and out-compete desirable food and cover plants. Within pine forests, the abundance of quail and the presence of several important nongame birds are strongly associated with the structure and composition of the ground layer vegetation.

In general, quail benefit from grass and forb ground cover that develops in open and frequently burned pine forests, and for the first two to four years following forest regeneration cuts. Management for maximum economic return from timber is not consistent with providing optimum habitat for quail. However, through careful planning, timber can be managed for reasonable economic returns while maintaining huntable quail populations.

A variety of silvicultural techniques and habitat management practices can be used to integrate quail habitat with pine forest management. These practices include timber harvest and regeneration, establishment and management of openings, and prescribed burning. The specific timing and intensity of implementing these practices often must be varied to meet site-specific conditions. However, there are some general management guidelines that can be followed to enhance habitat for quail and other early successional wildlife in pine forests.

Pine Forest Management Methods

All-aged and even-aged management are the two primary methods of forest management. All-aged management results from harvesting groups of trees frequently throughout the life of a stand. The stand then will be comprised of trees of all age classes. When appropriately applied, this is the most complex and intensive method of forest management. It requires an extensive access system throughout the forest stand and increases the complexity of prescribed burning since young pine regeneration areas (except for longleaf) must be protected from fire. Since southern pines are shade intolerant, all-aged management necessitates maintaining a low density of overstory trees, which also enhances ground cover conditions for bobwhite quail.

Even-aged management is the most commonly used forest management method. It results from the harvest and regeneration of entire stands of trees at a given point in time (called the rotation age) thus creating a new stand of trees of the same age. Regeneration methods for even-aged management include clear-cutting followed by planting of seedlings, leaving a few seed trees or many seed trees, called a shelterwood. Even-aged management is less complex and less costly to implement on an extensive scale than all-aged management. Quail populations often increase during the first two to four years after a stand has been cleared for regeneration. However, even-aged management results in entire stands of trees passing through the sapling stage (ages four to 15 years depending on the site) at stocking densities that shade out ground cover and are not conducive to providing quality habitat (Fig. 2) or desirable hunting conditions for quail.

Fig. 2

Fig. 3

Quail habitat can be maintained in pine forests that are managed with even-aged or all-aged methods. The management goal is to keep most of the ground in direct sunlight, control plant succession to maintain a diversity of grasses and forbs in the understory, and control hardwood invasion (Fig. 3).

Pine Species Selection

Fig. 4

All pine forest types can be managed to enhance habitat conditions for quail. However, pine species historically indigenous to the site should be used when regenerating pine stands. Longleaf pine (Fig. 4), within its historic range, is better suited for quail management than loblolly, shortleaf or slash pine because: 1) it has a sparse crown thereby allowing more sunlight to reach the forest floor; 2) it is long-lived thereby providing increased management flexibility and a greater percentage of the total stand life in a suitable habitat condition; 3) it has a seed that is nutrient rich and highly preferred by quail; 4) it is relatively disease and insect resistant; 5) it is less prone to windthrow; and 6) it can be burned while in the grass stage.

The longleaf pine ecosystem once occupied approximately 21 million acres in Georgia, covering most of the Upper and Lower Coastal Plain and extending into the Ridge and Valley Province. Unfortunately the longleaf ecosystem has been greatly diminished due to conversion to other forest types and land uses, contributing substantially to the decline in quail populations.

Site Preparation

Sites can be prepared for regeneration in a variety of ways ranging from those of low intensity, like prescribed burning, to those of high intensity, like shearing, raking, piling, burning and/or herbicides. The methods used affects plant succession. Prescribed burning and intense mechanical methods, especially when applied during winter months, seem to produce the most desirable food and cover conditions for quail. These techniques result in extensive stands of erect annual weeds including important quail food plants like ragweed, partridge pea and lespedezas. This provides excellent brood range, fall/winter food, and screening cover.

Herbicides are commonly used for site preparation, as well as later in the life of the stand, to retard or kill competing vegetation. The impact of herbicides on quail habitat varies greatly depending on the herbicide(s) used and the method of application. In general, selective applications that leave legumes, blackberries, native grasses, and other important quail food and cover plants should be favored over those that control all vegetation. Additional research is needed to determine the impacts of various site preparation techniques on short-term and long-term habitat conditions for quail and other wildlife.

Seedling Spacing

Pine stand re-establishment requires artificial or natural regeneration. Seedling spacing determines the number of years until the tree crowns overlap and shade out the understory. With artificial regeneration, wide tree row spacing (such as seedlings every eight feet in rows 12 feet apart) allows for the establishment and maintenance of grasses, forbs, legumes,

soft mast producers and cover plants. Additionally, 15 to 40 percent of each stand should be established in openings of two to five acres in size. These openings can be managed through combinations of winter disking, prescribed burning, herbicide application, mowing and planting to provide food, cover and brood range.

Natural regeneration by seed tree or shelterwood often results in dense seedling stands that quickly out-compete grasses and forbs. These seedling stands should be thinned pre-commercially or the stem density can be reduced by judicious skidding of the residual seed trees at the time of their removal.

Thinning

Thinning should be frequently used in pine stands to improve quail habitat, upgrade timber quality, and provide revenue to the landowner. Stands should be thinned to maintain 40 to 60 percent of the ground in direct sunlight at noon (Fig. 5). Heavier thinnings are necessary on infertile soils to produce the desired ground cover. Within pine plantations, removing entire rows (Fig. 6) and then thinning out the diseased or deformed trees within rows, is recommended. Regardless of the thinning method used, the majority of the ground must be in direct sunlight.

When practical, conduct thinning operations during the winter months so that the resulting soil disturbance stimulates growth of important quail foods and cover plants.

Fig. 5

Fig. 6

Rotation Age

The time to harvest and regenerate pine stands depends on economic, wildlife and aesthetic objectives, pine species present, site fertility and overall stand health. Where quail are part of the management objective, long rotations should be favored. This can be over 60 years for loblolly, slash and shortleaf pine, and over 200 years for longleaf pine. Long rotations present managers with the opportunity to maintain a greater percentage of the total stand life in a suitable condition for quail. They also offer greater flexibility and ease in management. However, huntable populations of quail can be maintained on sites under short rotation management if careful planning occurs to ensure the establishment and maintenance of suitable ground cover conditions.

Where short rotations are used, special consideration should be given to the location and distribution of forest regeneration areas, establishment and maintenance of openings, and the management of roads and roadsides to provide food, cover and travel avenues for quail.

Managing Hardwoods Within Pine Stands

Most pine stands have drainage courses, depressional wetlands, or other types of hardwood inclusions. These areas provide critical habitat for many wildlife species. However, they shade-out understory quail food and cover, and also may serve to increase the abundance of predators and impact quail reproduction and survival. Thinning the hardwoods combined with prescribed burning along the edges and within these habitats will result in improved ground cover for quail and may reduce predator abundance and efficiency of game and nongame species that require closed canopy hardwoods and abundant hard mast such as acorns. However, the manager should be aware that this can result in lower habitat quality for a variety of game.

Likewise, when hardwoods invade and occupy the midstory of pine stands they shade out the grass and forb ground cover needed by quail. On longleaf/wiregrass sites, this condition can be controlled by the use of growing season prescribed fire. However, in pine stands established on old field sites, it may be necessary to periodically use mechanical or chemical techniques in conjunction with prescribed fire to remove hardwoods and restore desirable ground cover conditions.

Prescribed Burning

When used correctly, prescribed burning is one of the most effective and efficient tools available for managing quail habitat (Fig. 7). Prescribed fire: 1) increases insect, legume, and soft mast abundance; 2) improves ground layer vegetative structure to enhance nesting cover, brood range, and insect and seed foraging conditions; 3) helps to control hardwood invasion into the forest midstory; 4) decreases the abundance of invertebrates that parasitize quail; and 5) decreases the chances of wildfire.

Prescribed burns should be applied to recently thinned stands that have at least 40 percent of the ground in sunlight. Burning is of little wildlife value in forest stands where sunlight cannot reach the forest floor. Prescribed burns should be conducted annually, with approximately 30 to 50 percent of the land left unburned to provide food, nesting and escape cover.

Fig. 7

Another alternative is to establish permanent firebreaks that divide the site in a checkerboard fashion into 10-acre to 50-acre blocks (smaller is better). Then, these blocks can be burning in a mosaic pattern on a two-year cycle where one half of the woodlands are burned each year. On infertile soils, burning on a three-year or longer cycle may be sufficient. On most sites, prescribed burns should be conducted during winter through early spring. Occasional growing season burns may be needed to more effectively control hardwood encroachment into pine stands. More specifically, pine stands established on old agricultural fields have fuel conditions that are best suited to winter burning, while longleaf/wiregrass stands are well adapted for growing season fires.

Prescribed burning should be initiated in pine stands at the earliest possible age. Longleaf stands can be burning in their second year when seedlings are still in the grass stage. Other pine species usually can be burned for the first time when they are 10 to 15 feet tall. Timber stands managed under all-aged systems require special consideration for prescribed fire. Prior to prescribed burning, young pine regeneration areas which are scattered throughout the stand, must be protected by firebreaks. Longleaf pine seedlings are the exception, and should be burned when in the grass stage to control brown spot disease.

Dense scrub hardwood stands have little value for quail and are difficult to manage. Repeated late spring burning helps open the stand, allowing the growth of beneficial quail plants. However, if the sprouts are more than one and one-half inches in diameter at chest height, mechanical means such as cutting, rotary mowing, bulldozing, and/or herbicides may be required in initial control attempts.

Before burning, a person experienced in fire behavior must evaluate the property's fuel type, planning the timing of the burn with relative humidity, fuel moisture, wind speed and direction. The fire plan should allow for adequate firebreaks, identifying smoke sensitive areas. Burn permits and proper equipment are required. Permits may be obtained from the Georgia Forestry Commission (GFC). The GFC and the Department of Natural Resources can make recommendations for controlled burning.

Forest Openings, Roads, and Permanent Firebreaks

Idle openings are critical for providing brood range, food and cover for quail. As previously indicated, 15 to 40 percent of each forest stand should be maintained in openings that are two to five acres in size. Rotational winter disking, planting, and burning, should be applied to these openings so that one-third to two-thirds of each opening remains fallow each year. Herbicides may be needed if exotic grasses and/or hardwoods invade the site.

Roads and firebreaks are necessary components of timber management and can be managed as fallow opening habitat. They can be especially important for providing food, cover and travel avenues for quail while young pine stands are in the sapling stage. When a stand is regenerated or thinned, roadsides can be widened to 20 feet to 40 feet on each side, and these areas can be managed as long, linear fallow fields. Roads and firebreaks with north-south orientation are best suited for planting as they receive the most sunlight during the growing season. These linear habitats can be used to connect fallow openings within pine stands.

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Cooperating Agencies:

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